
**THE WALL BROWN *Lasiommata megera* L.
(LEP.: NYMPHALIDAE) IN NORTHUMBERLAND, 1976-2000**

H. A. ELLIS

16 Southlands, Tynemouth, North Shields NE30 2QS

Introduction

IN RECENT YEARS there seems to have been a decline in the fortunes of the Wall Brown *Lasiommata megera* L. in much of England, particularly in the southern centre of its range (Goodhand, 1999). Recently, Tyler-Smith (2000) has drawn attention to a serious decline over the last twenty years within northern Oxfordshire and northern Buckinghamshire and was able to record only two Wall Brown butterflies there in twenty-five tetrads during 1997-99. In spite of a statement to the contrary (Tyler-Smith, 2000), it should be stressed that this remarkable decline has not occurred nationally. Here in north-east England, after a decline in the 19th century (Robson, 1899; Dunn & Parrack, 1986), there has been a notable improvement in the status of the Wall Brown since the 1970s. The species has rapidly extended its range and increased in numbers, initially in County Durham (Dunn, 1974; Dunn & Parrack, 1986) and subsequently in Northumberland (Ellis, 1994).

The purpose of the present paper is to illustrate how the Wall Brown has become established and continues to thrive in Northumberland by reference to my own experience of the species during the past twenty-five years.

Methods

Information concerning the dates and locations of butterfly sightings and the numbers of butterflies was extracted from personal diaries and species record cards kept since 1964. Comparisons of the mean values of the various groups of data have been made using the Student's "t" Test. Means are stated as mean \pm Standard Error (S.E.). The correlation coefficient (r) has been calculated to test the significance of any apparently linear relations.

Results

The data obtained are summarised in Table 1.

The recent history of the Wall Brown in Northumberland may be conveniently divided into three phases covering the years 1976-80, 1981-90 and 1991-2000, respectively.

1. 1976-80, Early beginnings

In spite of visiting many suitable locations from 1964, including some where the Wall Brown subsequently appeared, it was not until 1976 that I encountered my first (3) Wall Brown butterflies in Northumberland on the banks of the River Tyne estuary at Tynemouth. None was seen again until

1978 when four were recorded, two at Tynemouth and one each at nearby North Shields and at Whitley Bay on the coast about 6.5km further north. There were seven sightings in 1979, including six at the original Tynemouth location in 1976. One of two records in 1980 was also at Whitley Bay but the other was near the coast about 25km further north at Cresswell. At the time these records were totally unexpected and were referred to the Biological Records Centre, Monks Wood for inclusion in the *Atlas of Butterflies* (Heath, Pollard & Thomas, 1984).

Year	Number of Wall Brown		Number of tetrads		
	Total	Maximum/visit	Total	New	Accumulated
1976	3	3	1	1	1
1977	0	0	0	0	1
1978	4	1	3	3	4
1979	7	6	2	0	4
1980	2	1	2	2	6
1981	14	5	5	4	10
1982	73	48	7	1	11
1983	32	30	3	1	12
1984	42	24	7	3	15
1985	13	6	4	2	17
1986	10	6	3	1	18
1987	15	9	4	2	20
1988	13	10	3	2	22
1989	49	12	8	1	23
1990	65	16	12	2	25
1991	86	26	13	7	32
1992	129	35	18	4	36
1993	87	23	12	2	38
1994	157	63	16	1	39
1995	89	14	19	3	42
1996	154	46	27	5	47
1997	70	13	16	0	47
1998	67	28	13	4	51
1999	205	30	22	3	54
2000	168	25	23	1	55

Table 1. Numbers of Wall Brown butterflies and tetrads recorded in Northumberland from 1976 to 2000.

Totals: 1,554 butterflies within 55 different tetrads.

Overall, during 1976-80 only 16 (annual mean, 3.3 ± 1.2) Wall Brown butterflies were noted at seven different locations within six tetrads ($2\text{km} \times 2\text{km}$ square). At many sites I visited in the county none was seen, although other species of butterfly were noted in what appeared to be suitable habitats for the Wall Brown. Thus I recorded one or more species of butterfly within 49 different tetrads during the five-year period and the Wall Brown was found

in only six (12.2%) of these. Most of the individuals recorded (14, 87.5%) were of the summer (second) brood and the maximum seen at any one visit was six at Tynemouth estuary in September 1979.

2. 1981-90, The Wall Brown becomes established

During this decade the Wall Brown was recorded in increasing numbers at additional locations and further afield. Although most of the recorded tetrads continued to be in the south-east corner of Northumberland (VC 67), there were occasional records from further inland, for example, on wasteland in Newcastle-upon-Tyne (August 1981) and in an old limestone quarry at Brunton Bank near Chollerford (May 1984), which are situated about 12km and 44km west of Tynemouth, respectively. The Wall Brown was also recorded at the coast much further north near Howick at Cullernose Point (September 1986), which is about 50km north of Tynemouth.

The annual number of Wall Brown fluctuated considerably from 10 to 73 (mean, 32.6 ± 7.4), with the period 1985-88 being poor years whilst 1982 (73), 1984 (42), 1989 (49) and 1990 (65) were particularly good years. These high annual counts were mostly attributable to the presence of unusually large numbers at some locations, for example, 48 on the banks of the old World War II coastal firing range at Whitley Bay (August 1982) and 24 at Holywell Dene Seaton Sluice (September 1984). A total of 326 Wall Brown butterflies was recorded over the decade.

Comparison of the mean annual numbers of Wall Brown butterflies in the two phases 1976-80 (mean, 3.2 ± 1.1) and 1981-90 (mean, 32.6 ± 7.4), reveals a significant increase in the latter period ($0.02 > P > 0.01$). Within the decade 1981-90 there was much annual fluctuation in numbers and there is no significant difference between the means for the first (34.8 ± 11.0) and second (30.4 ± 11.2) five-year periods ($P > 0.10$).

The Wall Brown was found in from three to 12 tetrads each year during 1981-90. There were from one to four new tetrads per annum and a total of 19 new tetrads over the decade.

The accumulative 15-year totals for the first two phases, 1976-80 and 1981-90 were 342 Wall Brown butterflies recorded within 25 different tetrads.

3. 1991-2000, The Wall Brown thrives

During this decade the Wall Brown was recorded in increasing numbers and in more tetrads. The annual number of butterflies varied from 67 to 205 (mean, 121.2 ± 15.1), with particularly high counts in 1994, 1996, 1999 and 2000 (Table 1). These high counts occasionally resulted from there being unusually large numbers of butterflies at a single site, but were often because of the presence of the species at many locations. Over the decade 1,212 Wall Brown butterflies were recorded, which is a figure $3.7 \times$ that for the previous decade (326), representing a significant increase in the mean annual numbers

for 1991-2000 (mean, 121.2 ± 15.1) in comparison with 1981-90 (mean, 32.6 ± 7.4) ($P < 0.001$). Although more Wall Brown were recorded in the last two years of the survey (1999 & 2000), suggesting a continued improvement, comparison of the mean annual numbers for the first (mean, 109.6 ± 14.3) and second (mean, 132.8 ± 27.5) five-year periods of the decade 1991-2000 reveals no significant difference ($P > 0.10$) (Figure 1.)

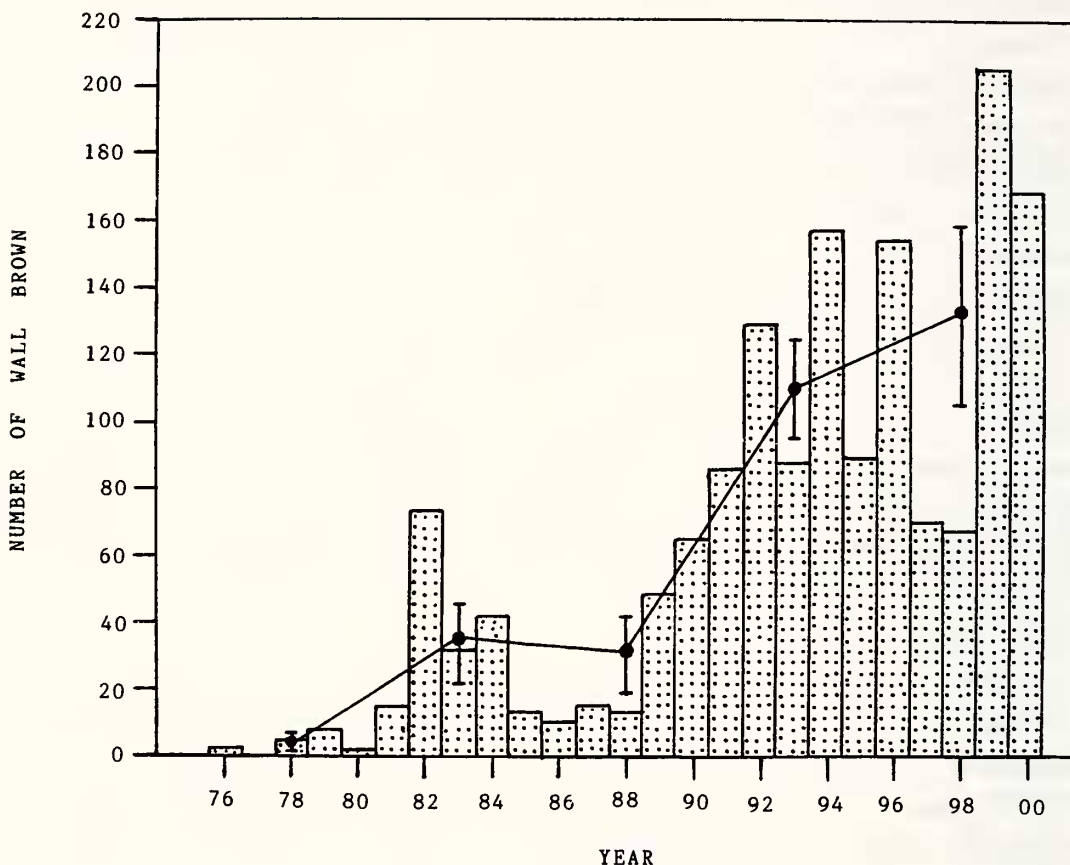


Figure 1. Histogram showing the number of Wall Brown butterflies recorded in Northumberland in each of the twenty-five years 1976 to 2000. The mean \pm standard error value for each of the five consecutive quinquennia is superimposed.

During 1991-2000 the Wall Brown was recorded in 49 different tetrads with a range of 12 to 27 tetrads per annum. From one to seven new tetrads were found each year with a total of 30 new tetrads over the decade (Table 1).

In 1996 I recorded all species of butterfly within 63 different tetrads in Northumberland and the Wall Brown in 27 (41.3%) of these. In the final year of the survey (2000) I recorded the Wall Brown in 23 (50%) of the 46 tetrads in which I recorded all species of butterfly in Northumberland. Both these compare favourably with the situation in the early years 1976-80 when, as stated above, the Wall Brown was sighted in only six (12.2%) of 49 tetrads.

The combined totals for the three phases over the twenty-five years of the study were 1,554 Wall Brown butterflies within 55 different tetrads. Overall there was a trend upwards with time as shown in Figure 1 which is a

histogram of the number of Wall Brown butterflies in each of the twenty-five years together with the mean values (mean \pm S.E.) for the successive quinquennia.

Numbers of Wall Brown at individual visits

The number of butterflies recorded at the time of a single visit was variable and commonly there were only one or a few. The data for the two quinquennia 1991-95 and 1996-2000 summarised in Table 2. are representative.

Numbers of Wall Brown	Numbers of records (%)		
	1991-95	1996-2000	1991-2000
1	47 (43.5)	63 (43.4)	110 (43.5)
2-5	29 (26.9)	50 (34.5)	79 (31.2)
6-10	19 (17.6)	16 (11.0)	35 (13.8)
11-15	5 (4.6)	10 (6.9)	15 (5.9)
16-20	0 (0)	1 (0.7)	1 (0.4)
21-25	5 (4.6)	2 (1.4)	7 (2.8)
26-30	1 (0.9)	2 (1.4)	3 (1.2)
31-35	1 (0.9)	0 (0)	1 (0.4)
>36	1 (0.9)	1 (0.7)	2 (0.8)
Totals	108 (100)	145 (100)	253 (100)

Table 2. Distribution of the numbers of Wall Brown butterflies recorded at each visit during the quinquennia 1991-95 and 1996-2000.

Flight periods and seasonal numbers

The first (spring) and second (summer) flight periods were distinct with a clear-cut interval during much of July. The earliest sighting was at the Spetchells, Wylam – a warm sheltered inland location in south Northumberland on 23 April 1995 and the latest further north at Bebside near Bedlington on 11 October 1986. However, most butterflies of the first brood appeared during the second week of May and remained on the wing until the last week of June or the first week in July, by which time most appeared very worn. The second brood appeared during the last few days of July and in early August and most disappeared by the third to fourth week in September. For example, in the decade 1991-2000, the earliest and latest sightings for the first and second broods were 23 April-31 June and 30 July-23 September, respectively. There did not appear to be any consistent change in the duration of either of the two flight periods over the years and there was no evidence of a third brood in any year.

In general, fewer butterflies were recorded in the first than in the second brood. Overall, from 1976-2000, of the 1,554 Wall Brown butterflies 259

(16.7%) and 1,295 (83.3%) were recorded in the first and second broods, respectively; a ratio of 1:5. Although in some years there were unusually large numbers recorded in the first brood (1997, 47.1%; 1998, 56.7%), the combined data for each of the five successive quinquennia were similar (Table 3).

Years	Total	Numbers of Wall Brown	
		Spring (%)	Summer (%)
1976-80	16	2 (12.5)	14 (87.5)
1981-85	174	21 (12.1)	153 (87.9)
1986-90	152	27 (17.8)	125 (82.2)
1991-95	548	74 (13.5)	474 (86.5)
1996-00	664	135 (20.3)	529 (79.7)
Combined	1554	259 (16.7)	1295 (83.3)

Table 3. Numbers and percentages of Wall Brown butterflies recorded in the spring (first) and summer (second) broods in Northumberland during each of the five consecutive quinquennia from 1976 to 2000.

Relation between numbers of Wall Brown and numbers of tetrads

Plotting on a graph the pairs of values for the number of tetrads and the corresponding year reveals an approximate straight line. Calculation reveals a significant positive linear correlation ($r = 0.885$; $P < 0.001$). A similar plot of paired values for the number of Wall Brown and corresponding year reveals a positive trend, but this appears curvilinear rather than linear and individual points are widely scattered and calculation of the linear regression coefficient is inappropriate. A plot of the numbers of Wall Brown against the numbers of tetrads reveals a scatter about an approximate straight line and calculation shows there is a highly significant positive linear correlation ($r = 0.928$; $P < 0.001$).

Discussion

As the present records show the Wall Brown often occurs in small numbers at any given location and for this reason may be overlooked (Emmet & Heath, 1989). Although my records are not based on regular "transect walks" (Pollard, Moss & Yates, 1995), I have made a thorough search of each locality visited. Whilst not suitable for full population studies the data provide a reasonably reliable indication of the presence or absence of the species at a given site. Indeed a prolonged search may occasionally be of greater value than a relatively shorter and more restricted "transect walk", in determining the presence of a species which occurs in small numbers at a given location.

Most of my Wall Brown records relate to south-east and east Northumberland (VC 67) with only a few tetrads (four of 55) recorded in

north-Northumberland (VC 68). The northernmost record was on the east coast at Cullernose Point (NU 261187) and the westernmost at Brunton Bank Quarry near Chollerford (NY 929701). In general the mid and western parts of VC 67 and much of VC 68 have been less-well recorded. Hence it is uncertain that the relative lack of Wall Brown records in North Northumberland (VC 68) is a true indication of the status of the species or, is partially attributable to under-recording. However it should be noted that the region has not been entirely overlooked by recorders who, like myself, have noted many other species of butterfly over many years and particularly during deliberate searches carried out as part of the Millennium Map Project. I believe that to date the Wall Brown has not recolonised North Northumberland to the extent which it has in the south and east of South Northumberland. This view accords with the observation that the Wall Brown is not becoming commoner further north over the border in East Scotland, where there has been only one record during the recording for the *Millennium Atlas* (R. Buckland, pers. comm.). My data accumulated over twenty-five years since 1976 indicate that the Wall Brown has successfully recolonised at least parts of Northumberland and where it has done so it now flourishes with no evidence of a regional decline up to the 2000 season.

This is in marked contrast to the reported serious decline which has occurred in central southern England (Tyler-Smith, 2000). In this respect it is interesting to compare Tyler-Smith's data and mine for the three years 1997 to 1999. During this period in Northumberland I recorded 342 individual Wall Brown butterflies within 29 different tetrads whilst Tyler-Smith recorded only two in 25 tetrads in northern Oxfordshire and northern Buckinghamshire!

Reasons for the fluctuations in the fortunes of the Wall Brown

The reason for the 19th century decline and recent upturn in the fortunes of the Wall Brown in Northumberland are a matter for speculation. It is tempting to believe that the 19th century decline, which also affected other species such as the Comma *Polygonia C-album* (L.), resulted from a series of changes, including the marked deterioration in the weather (Holford, 1982), and the loss of habitats and atmospheric pollution associated with increasing industrialisation which occurred at that time. Contrariwise, the recent improvement in the status of the Wall Brown might be due to climate and weather changes which have resulted from global warming (Dennis & Bramley, 1985; Dennis, 1993; Ellis, 1994; Pollard, Moss & Yates, 1995; Parmestan *et al*, 1999). The view that there is some general underlying factor which is responsible, such as climatic change, gains support from the recent parallel improvements which have taken place in the status of several other species of butterfly in Northumberland. The Orange Tip *Anthocaris cardamines* (Verity), Peacock *Inachis io* (L.) and Large Skipper *Ochlodes venata* (Bremer & Grey) have all become more frequent and widespread in

recent years (Ellis, 1998), whilst the Small Skipper *Thymelicus sylvestris* (Poda) has colonised the region from further south probably for the first time (Ellis, 1999a) and the Comma has returned from further south to recolonise much of Northumberland (Ellis, 1999b; Ellis & Waller, 2000).

Although the overall trend during the past twenty-five years has been upwards there have been times at some localities when, in spite of repeated visits, numbers were found to be low or no Wall Brown butterflies were recorded after it had been known to be present in previous years. These fluctuations sometimes occurred synchronously in neighbouring locations, for example, the temporary decline, noted at the bank of the River Tyne estuary and at the coast about 6.5 km further north at Whitley Bay from 1985-1989. Often there was no obvious explanation for these temporary declines, but sometimes severe weather conditions such as the extremely wet months of June in 1980 and 1997, which were the wettest on record since 1859, might have played a part. Also, one site overlooking the River Tyne estuary suffered a temporary setback at the time of the Tall Ship Race, June 1986, when additional extensive grass cuttings were made in preparation for the many thousands of visitors who trampled the area.

At some sites, visited for several years, the Wall Brown was initially absent and following its appearance thrived for a few years only to decline later and disappear as the area became overgrown, shaded and unsuitable as a habitat. A few locations became lost completely to building and housing developments.

Clearly, it is an oversimplification to attribute the changing fortunes of any species of butterfly solely to climatic change. Increased temperatures associated with global warming appear to have provided the essential background conditions which have enabled the Wall Brown and other species to exploit the various habitats in the region. Although some habitats have become unsuitable, here in Northumberland we have been fortunate in that many suitable and sometimes interconnected habitats have become available in recent years in the form of reclaimed land from former collieries, waste tips, open-cast mining sites and dismantled mineral railways and wagonways. These sites, particularly former railways, provide an excellent habitat for a wide range of flowering plants and butterflies, and have become of considerable ecological importance. The larvae of the Wall Brown, like those of the Large Skipper and Small Skipper, are grass (Gramineae) feeders. These species, by taking advantage of suitable weather conditions, have rapidly colonised the newly-available habitat with its abundant supply of the larval foodplant and flowering plants for the nectaring adults. The Wall Brown finds such places suitable also because they provide sheltered grassland with areas of bare earth which are necessary for optimal egg-laying. (Dennis & Bramley, 1985). Warm patches of bare ground also provide basking areas which the Wall Brown utilises to regulate body temperature (Thomas & Lewington, 1991).

Apart from the increased numbers and wider distribution of the Wall Brown in Northumberland, I have not observed any other changes which might be attributable to the effects of global warming. The effects of an increased temperature are well-known (Dennis & Shreeve, 1991), and in addition to increased numbers at a site, include shifts in the flight periods and the occurrence of additional broods. In Northumberland a plot of the numbers of Wall Brown records against the corresponding dates shows a characteristic Normal bimodal distribution of a double-brooded species with nothing to suggest a third brood and there is no change in the distribution pattern over the twenty-five years to suggest any extension or shift of the flight periods. The significant positive correlation found between the number of Wall Brown butterflies and the numbers of tetrads occupied over the twenty-five years supports the view that increased spread, rather than increased numbers at individual locations, mostly accounts for the observed success of the species in Northumberland.

Whilst there have always been fluctuations in climate over the years, it now seems to be generally accepted that there is a superimposed alteration on account of global warming. A rise in temperature in northern areas such as Northumberland, where the Wall Brown is reaching the northernmost limit of its range, may be beneficial, whereas a similar rise in the south, especially in drought conditions, could prove disadvantageous because of the possible untoward effects on the larval foodplant, the flowering plants used as a source of nectar or even on the biology of the butterfly itself.

As we are becoming only too aware global warming is not without its undesirable effects on climate and leads to an increased frequency of extreme weather conditions, some of which may be unfavourable for butterflies at a regional or national level. Added to this there are local changes which may affect the suitability of a habitat or even destroy it. It is noteworthy that the Wall Brown is able to survive in sites which appear unsuited to other species of butterfly. Although often found in apparently self-contained colonies the Wall Brown is a well-known nomad (Thomas & Lewington, 1991) and is one of those species with the potential to extend its range when climatic conditions improve (Dennis & Bramley, 1985), as appears to have occurred in Northumberland since 1976.

References

- Dennis, R.L.H., 1993. *Butterflies and climate change*. Manchester University Press, Manchester.
- Dennis, R.L.H. & Bramley, M.J., 1985. The influence of man and climate on dispersion patterns within a population of adult *Lasiommata megera* (L.) (Satyridae) at Brereton Heath, Cheshire (U.K.). *Nota lepid.* **8**(4): 309-324.
- Dennis, R.L.H. & Shreeve, T.G., 1991. Climatic change and the British butterfly fauna: opportunities and constraints. *Biological Conservation* **55**: 1-16.
- Dunn, T.C., 1974. The Wall Brown butterfly. *Vasculum* **59**(4): 41.

- Dunn, T.C. & Parrack, J.D., 1986. The Moths and Butterflies of Northumberland and Durham, Part 1: Macrolepidoptera. *Vasculum* Supplement No. 2. pp.22-23.
- Ellis, H.A., 1994. The status of the Wall Brown butterfly, *Lasiommata megera*, in Northumberland, 1965-91, in relation to local weather. *Trans. Nat. Hist Soc. Northumbria* **56**: 135-152.
- , 1998. The current status and history of the Large Skipper *Ochlodes venata* Bremer and Grey in Northumberland. *Vasculum* **83**(3): 41-67.
- , 1999a. The Small Skipper *Thymelicus sylvestris* Poda (Lep.: Hesperiiidae) in North-east England: History and current status. *Entomologist's Rec.J.Var.* **111**: 223-225.
- , 1999b. Return of the Comma *Polygonia c-album* L. (Lep.: Nymphalidae) to Northumberland: Historical review and current status. *Entomologist's Rec.J.Var.* **111**: 227-231.
- Ellis, H.A. & Waller, I.J., 2000. Records of the Comma *Polygonia c-album* L. (Lep.: Nymphalidae) in North-east England from 1995 to 1999. *Entomologist's Rec. J.Var.* **112**: 221-223.
- Emmet, A.M. & Heath, J., 1989. *The Moths and Butterflies of Great Britain and Ireland*. 7(1). Hesperiiidae-Nymphalidae. Butterflies, Harley Books, Great Horkeley, p.251.
- Goodhand, A., 1999. The mysterious decline of the Wall Brown (*Lasiommata megera*). *Butterfly Conservation News* **71**: 7.
- Heath, J., Pollard, E. & Thomas, J., 1984. *Atlas of Butterflies in Britain and Ireland*. Institute of Terrestrial Ecology, Biological Records Centre Monks Wood, Harmondsworth.
- Holford, I., 1982. *The Guinness Book of Weather Facts and Feats*. 2nd. ed. Guinness Superlatives Ltd., Enfield.
- Parmesan, C., Ryrholm, N., Stefanescu, C., Hill, J.K., Thomas, C.D., Descimon, H., Huntley, B., Kaila, L., Kullberg, J., Tammaru, T., Tennent, W.J., Thomas, J.A. & Warren, M., 1999. Poleward shifts in geographical ranges of butterfly species associated with regional warming. *Nature* **399**: 579-583.
- Pollard, E., Moss, D. & Yates, T.J., 1995. Population trends of common British butterflies at monitored sites. *J. Appl. Ecol.* **32**: 9-16.
- Robson, J.E., 1899. A catalogue of the Lepidoptera of Northumberland, Durham, and Newcastle-upon-Tyne. *Nat. Hist. Trans. Northumberland, Durham, and Newcastle-upon-Tyne* **12**: 28-29.
- Thomas, J. & Lewington, R., 1991. *The Butterflies of Britain & Ireland*. Dorling Kindersley, London. pp. 166-168.
- Tyler-Smith, C., 2000. The Wall Brown *Lasiommata megera* L. (Lep.: Nymphalidae) in central England, 1997-1999. *Entomologist's Rec. J. Var.* **112**: 207-208.

Sophronia semicostella (Hb.) (Lep.: Gelechiidae) in North Hampshire

A specimen of this scarce moth flew to light here on 6 July 2000 and I am grateful to Dr J. R. Langmaid for its identification. This occurrence would seem to represent an eastward extension of its range in VC12. As the foodplant is sweet vernal-grass, *Anthoxanthum odoratum*, a very common plant, it may seem strange that the insect is not seen more frequently.—
ALASDAIR ASTON, Wake's Cottage, Selborne, Hampshire GU34 3JH.